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AUTOSTART MOTOR.

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My invention relates to induction motors and is particularly valuable when applied to squirrel-cage induction motors, and this use of my invention will be described for the purpose of illustration in the following description. Induction motors have been built for many years by a large number of different manufacturing companies, both in the United States and abroad. The principles of design are well known and the characteristics of such motors have become very thoroughly standardized.

In the use of induction motors in driving various machinery it is necessary that the current drawn from the source of supply in starting be held within certain limits on account of the effect of instantaneous large rushes of current on the voltage regulation of such sources of supply. On the small sizes of induction motors, that is to say, in motors of 5 H. P. and below, the starting current is not of great importance due to the small size of the motor and the small amount of current taken. On motors larger than 5 H. P. practically all of the companies supplying electricity insist that the starting current of any induction motors connected to their electric supply circuits be limited, and they usually insist that the proportion of the starting current to the full load current of the motor shall be reduced as the size of the motor is increased.

In ordinary practice throughout the United States the power supply companies usually require that in induction motors of more than 5 H. P. capacity, the starting current must not exceed four times the normal full load running current, and in the case of the larger motors this value must be further reduced.

Prior to my invention it had been considered impossible to design an induction motor of a capacity above 5 H. P. which could be thrown upon the line without taking starting current above the values above stated, unless certain other desirable characteristics of the motor when running were sacrificed. It has, for example been recognized that the starting current taken could be reduced provided a motor of low efficiency, poor power factor and low pull-out were allowable, but motors having such characteristics are not readily salable and no such motors are at present on the market except possibly for some very special uses. It has, therefore, been necessary to provide special devices for induction motors above 5 H. P. capacity, either incorporated in the motor or external thereto, for the purpose of holding the starting current within permissible limits.

It is an object of my invention to produce an induction motor which can be connected directly to the line without taking excessive starting current and in which the other characteristics are kept within practical limits.

It is a further object of my invention to provide an induction motor with a rotor of the squirrel-cage type, having such inherent characteristics that low starting current is obtained, in which the entire electrically conducting system of the rotor is cast in a single piece so that all of the conducting members are molecularly united.

In the standard induction motor the magnetic flux induced by the primary conductors of the stator may be divided into useful flux, which is threaded through the secondary conductors on the rotor, and leakage flux which passes between the primary and secondary conductors and is thus ineffective to produce useful torque. Previous designers have sought to keep the leakage flux as small as possible, consistent with good mechanical and electrical design.

I have found that by a suitable proportioning of an induction motor I am able to greatly reduce the current taken by the motor from the source of supply during the acceleration period. This I accomplish in part by maintaining the proportion of leakage flux to the main flux during the starting period within certain limits, and I am further able to do this without reducing the power factor, efficiency or pull-out torque of the motor while running to an objectionable degree.

By these means I am able to produce motors having capacities above 5 H. P. which can be thrown directly on the line to start without the use of external starting devices,